4.29 Analog Input/Output Module SM334; AI 4/AO 2 × 8/8 bits; (6ES7 334-0CE01-0AA0)

Order number

6ES7 334-0CE01-0AA0

Characteristics

The analog input/output module SM 334: AI 4/AO 2 × 8/8 bits has the following characteristic features:

- Four inputs, two outputs
- Resolution 8 bits
- Not parameterizable, setting of measurement and output type by means of wiring
- Measuring range of 0 to 10 V or 0 to 20 mA
- Output range of 0 to 10 V or 0 to 20 mA
- Both voltage and current output options
- Non-isolated against the backplane bus interface
- Isolated from load voltage

Module view and block diagram of the SM 334; AI 4/AO 2 × 8/8 bits

Select the measuring method of the input channels and the output type of the output channels via the wiring.

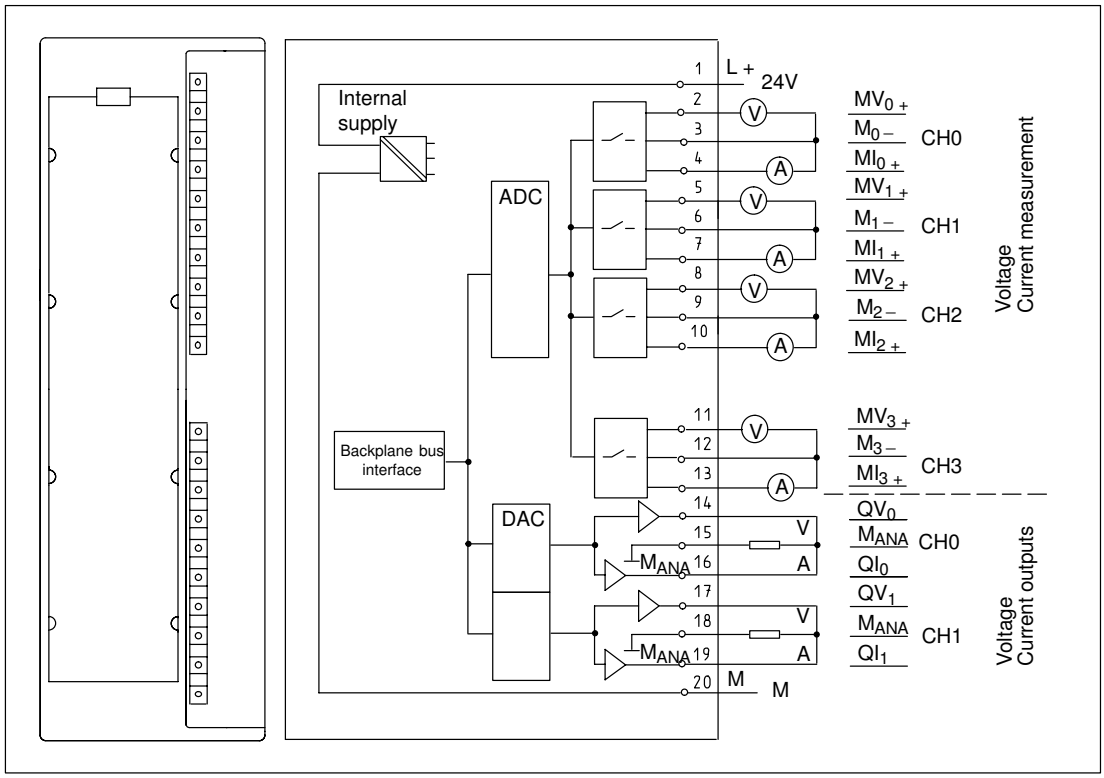

Figure 4-52 Module View and Block Diagram of the Analog Input/Output Module SM 334; AI 4/AO 2 × 8/8 bits

Technical specifications of the SM 334; AI 4/AO 2 × 8/8 bits

Dimensions and Weight	
Dimensions W × H × D (in millimeters)	40 × 125 × 117
Weight	Approx. 285 g
Data for Specific Module	
Supports clocked operation	No
Number of inputs	4
Number of outputs	2
Length of cable	
• Shielded	max. 200 m
Voltages, Currents, Potentials	
Rated load voltage L +	24 VDC
Power rated voltage of the rated electronics voltage and rated load voltage L+	24 VDC
Isolation	
• Between channels and backplane bus	No
• Between channels and power supply of the electronics	Yes
Between the channels	No
Permitted potential difference	
• Between inputs and M_{ANA} (U_{CM})	1 VDC
• Between the inputs (ECM)	1 VDC
Insulation tested with	500 VDC
Current consumption	
• From the backplane bus	max. 55 mA
• From power supply and load voltage L+ (no load)	max. 110 mA
Power dissipation of the module	typ. 3 W
Analog Value Generation for the Inputs	
Measuring principle	Instantaneous value conversion
Integration/conversion time (per channel)	
• Parameters can be assigned	No
• Integration time in milliseconds	500
• Basic conversion time including Integration time in milliseconds	100
• Resolution including sign	8 bits
Time constant of the input filter	max. 0.8 ms
Basic execution time of the module (all channels enabled)	max. 5 ms
Analog Value Generation for the Outputs	
Resolution including sign	8 bits
Conversion time (per channel)	max. 500 µs
Settling time	
• For resistive load	0.3 ms
• For capacitive load	3.0 ms
• For inductive load	0.3 ms
Suppression of Interference, Limits of Error for the Inputs	
Noise suppression for f = n × (f1 ± 1 %) (f1 = interference frequency)	
• Common-mode interference (U_{pp} < 1 V)	> 60 dB
Crosstalk between the outputs	> 50 dB
Operational limit (in the entire temperature range, with reference to the input range)	
• Voltage input	± 0.9 %
• Current input	± 0.8 %
Basic error (operational limit at 25° C, referred to input range)	
• Voltage input	± 0.7 %
• Current input	± 0.6 %
Temperature error (with reference to the input range)	± 0.005 %/K
Linearity error (with reference to the input range)	± 0.05 %
Repeatability (in steady state at 25 °C referred to input range)	± 0.05 %
Output ripple; range 0 to 50 kHz (referred to output range)	± 0.05 %

Suppression of Interference, Limits of Error	
Crosstalk between the outputs	> 40 dB
Operational limit (in the entire temperature range, with reference to the output range)	
• Voltage outputs	± 0.6 %
• Current outputs	± 1.0 %
Basic error (operational limit at 25 °C referred to the output range)	
• Voltage outputs	± 0.5 %
• Current outputs	± 0.5 %
Temperature error (with reference to the output range)	± 0.02 %/K
Linearity error (with reference to the output range)	± 0.05 %
Repeat accuracy (in the steady state at 25 °C referred to the output range)	± 0.05 %
Output ripple (bandwidth referred to the output range)	± 0.05 %

Status, Interrupts, Diagnostics	
Interrupts	None
Diagnostic functions	None

Data for Selecting a Sensor	
Input range (rated values)/Input resistance	
• Voltage	0 to 10 V/100 k Ω
• Current	0 to 20 mA/50 Ω
Maximum input voltage for voltage input (destruction limit)	max. 20 V continuous; 75 V for max. 1 s (duty factor 1:20)
Maximum input current for current input (destruction limit)	40 mA
Connection of the sensor	
• For measuring voltage	Possible
• For measuring current	
As two-wire transmitter	Not possible
As four-wire transmitter	Possible

Data for Selecting an Actuator	
Output ranges (rated values)	
• Voltage	0 to 10 V
• Current	0 to 20 mA
Impedance (in the nominal output range)	
• For voltage outputs	min. 5 kΩ
– Capacitive load	max. 1 μF
• For current outputs	max. 300 Ω
– Inductive load	max. 1 mH
Voltage outputs	
• Short-circuit protection	Yes
• Short-circuit current	max. 11 mA
Current outputs	
• No-load voltage	max. 15 V
Destruction limit against voltages/currents applied from outside	
• Voltage at outputs to M_{ANA}	max. 15 V continuous;
• Current	max. 50 mA DC
Connection of actuators	
• For voltage output	
Two-conductor connection	Possible
Four-conductor connection (measuring circuit)	Not possible
Connection of the sensor	
• For measuring current	
Two-conductor connection	Possible

4.29.1 Commissioning the SM 334; AI 4/AO 2 × 8/8 bits

The analog/output module SM 334; AI 4/AO 2 x 8/8 bits is a non-isolated module. You cannot program the SM 334; AI 4/AO 2 × 8/8 bits.

Important information on connecting the module

Note

Note when connecting the SM 334 that:

- the **analog chassis ground M_{ANA} (terminal 15 or 18) is connected to the chassis ground M of the CPU and/or the interface module (IM)**. Use a wire with a minimum cross-section of 1 mm^2 for this.

  If there is no ground connection between M_{ANA} and M, the module switches off. Inputs are read with $7FFF_H$; outputs return a value of 0. If the module is run without a ground connection for some time, it may be destroyed.
- the **supply voltage for the CPU and/or the interface module (IM) must not be connected with reversed polarity**. Reverse polarity causes the destruction of the module because M_{ANA} is subjected to an unauthorized high potential (+24 V).

Addressing

The inputs and outputs of the module are addressed as of the initial module address.

The address of a channel is obtained from the module start address and an address offset.

Input addresses

The following addresses apply to the inputs:

Channel	Address
0	Initial module address
1	Module start address + 2 bytes address offset
2	Module start address + 4 bytes address offset
3	Module start address + 6 bytes address offset

Output addresses

The following channel addresses apply to the module outputs:

Chan-nel	Address
0	Initial module address
1	Module start address + 2 bytes address offset

4.29.2 Measuring/Output Method and Measuring/Output Range of the SM 334; AI 4/AO 2 × 8/8 bits

You cannot program the SM 334; AI 4/AO 2 × 8/8 bits.

Selecting the measurement method and the type of output

Select the measuring method of an input channel (voltage, current) by wiring the input channel appropriately.

Select the type of output of an output channel (voltage, current) by wiring the output channel appropriately.

Unused channels

You must short-circuit unused input channels and you should connect them to M_{ANA}. In this way, you obtain an optimum noise immunity for the analog module.

Unused output channels must be left open.

Measuring ranges

The SM 334; AI 4/AO 2×8/8 bits has the measuring ranges
0 to 10 V and 0 to 20 mA.

Unlike the other analog modules, the SM 334 has a lower resolution and no negative measuring ranges. Take this into account when you read measured value tables 4-10 and 4-14 on pages 4-14 and 4-16.

Output ranges

The SM 334; AI 4/AO 2×8/8 bits has the output ranges 0 to 10 V and 0 to 20 mA.

Unlike the other analog modules, the SM 334 has a lower resolution the analog outputs do not have underranges. Take this into account when you read tables 4-35 and 4-37 on pages 4-29 and 4-30.